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Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA) is a public institution under the Ministry of Education Science and Technology (MOEST). CEMASTEAs is mandated to build the capacity of mathematics and science teachers for effective teaching and learning. The CEMASTEAs Research and Development (R&D) bulletin provides information and updates on researches undertaken and other activities in a given year. In this issue, updates and information are given for 2015. For more information, contact the Coordinator, R&D at rdcoordinator2015@gmail.com

Studies

1. The training needs assessment

The training needs assessment (TNA) for secondary school teachers was conducted in March 2015. This study involved secondary school mathematics and science teachers, principals of schools, Officers from the County Education Standards and Quality Assurance Council (ESQAC) and students in selected counties. Data were collected through questionnaires and lesson observation. It was found that teachers involved students in meaningful hands-on activities during lessons. However, opportunities for learners to engage in problem solving activities were rarely provided. In addition, most teachers did not give learners opportunities to interact with each other and the teacher during lessons. This was likely to affect the development of collaborative and communication as well as problem-solving skills among learners. The findings of the TNA thus informed the development of training Module for the 2016 secondary INSET.

2. The Tracer Study

This study was conducted in February 2015 to document classroom practices of teachers who have undergone Strengthening of Mathematics and Science Education (SMASE) training. The study involved 80 mathematics and science teachers (55 males and 25 females) from 24 counties across the country. It also involved 72 principals of the schools where the teachers teach and 3245 students taught by the teachers. Data were collected through questionnaires, lesson observation and one-on-one interviews.

Most of the teachers who participated in the study were found to be practising the principles of Activity, Student, Experiment and Improvisation-Plan, Do See and Improve (ASEI-PDSI) in their classes. They involved the students in meaningful activities geared towards making them learn and understand concepts taught effectively (see Figure 1 for one such activity)



Figure 1: Students constructing a dichotomous key using a variety of leaves in a biology class

The teachers acknowledged that SMASE training had made them improve their pedagogical skills and thus enabled them teach mathematics and science through hands-on experiences even without laboratories. For example, one of the physics teachers stated, "You can teach anything practically in class. You don't need any labs. . . . SMASE [training] opens the teacher who wants to change. If you don't want to change, there is nothing SMASE will do for you".

One of the factors that influenced the teachers to practice the principles of ASEI-PDSI were supportive principals who provided not only enabling environments but also teaching and learning resources.

The students who participated in the study were found to have positive attitudes towards mathematics and science subjects. Majority of them enjoyed learning these subjects and attributed their enjoyment to the way the teachers taught them as exemplified by the following statements about biology, chemistry, mathematics and physics teachers respectively.

- "My teacher is so open and relates what he is teaching with what is happening in the outside",
- "The teacher always explains chemistry concepts until we understand and conduct chem[istry] practicals with each one participating",
- "The mathematics teacher elaborates everything and makes sure it is well understood",
- "The teacher uses a simple language that helps in understanding the concepts taught and the subject is also interesting".

Conference

CEMASTEA held its first national conference on mathematics, science and technology education from 15th to 17th September 2015, at Kenya Commercial Bank Leadership Centre in Karen, on the outskirts of Nairobi. The conference theme was ***Innovative Pedagogy through Continuous Teacher Capacity Building***.



Figure 2: Participants follow conference proceedings

Papers were presented by among others, university dons and students, CEMASTEAs staff and teachers who included SMASE County Trainers. The papers presented addressed all the six sub-themes of the conference as follows: ICT integration in teaching and learning; Consideration of learners' ideas in teaching and learning; Enhancement of process skills in teaching and learning; Assessment, performance and achievement in teaching and learning; School-based teacher and learner capacity development initiatives (i.e., Lesson study, Peer-teaching and

Mentoring) and Contemporary issues in Education. It was resolved that the conference should be held after every two years.

Monitoring and evaluation of County INSET

Monitoring and Evaluation (M&E) of County INSET is undertaken by CEMASTEAs staff every April and August to establish the quality of INSET conducted at County level. In 2015, 82 out of 87 INSET centres that conducted INSET were visited and observed during INSET by CEMASTEAs staff. The findings of the M&E exercise revealed that majority of INSET centres held non-residential INSETs at 72% of all INSET centres visited. A total of 8481 out of the expected 9484 mathematics and science teachers were trained during 2015 County INSET. Furthermore, most of the INSET centres held INSET of good quality in terms of facilitation and management.

Writing for publication

It is now possible to write papers and books for publication using data and information from CEMASTEAs. Visit

<http://www.cemastea.ac.ke/index.php/2014-11-14-08-47-58/2014-11-14-09-00-47/category/17-research-development> for more information on how to obtain authority to use CEMASTEAs's data and/or information and benefits to CEMASTEAs and authors.

On-going researches

1. Partnerships and Linkages Department is investigating the impact of SMASE training in Strengthening of Mathematics and Science Education - Western, Eastern, Central and Southern Africa (SMASE-WECSA) Association member countries.
2. Chemistry Department is investigating factors that influence the choice of science subjects students study up to KSCSE in one of the Counties in Kenya.
3. Biology Department is investigating the effect of using the strategy of Encouraging, Capturing and Using learner ideas on students' motivation to learn biology in one of the secondary schools in Kenya.

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